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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/533,963	05/04/2005	Toru Tsurumi	050282	8041
23850 7590 04/14/2009 KRATZ, QUINTOS & HANSON, LLP 1420 K Street, N.W. Suite 400 WASHINGTON, DC 20005			EXAMINER NGUYEN, NGOC YEN M	
			ART UNIT 1793	PAPER NUMBER
			MAIL DATE 04/14/2009	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

### Office Action Summary

**Application No.**

10/533,963

**Applicant(s)**

TSURUMI ET AL.

**Examiner**

Ngoc-Yen M. Nguyen

**Art Unit**

1793

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 17 December 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 4-16 is/are pending in the application.
- 4a) Of the above claim(s) 13-16 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 4-12 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/CDC)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: \_\_\_\_\_
- Paper No(s)/Mail Date \_\_\_\_\_

### DETAILED ACTION

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 4-12 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

In claim 4, there is no clear antecedent basis for "*the concentration* of neutralized hydroxides, ... in *the fines particles of the complex inorganic metal hydrate in the liquid...*", it is unclear if the "raw material liquid", as stated in the preamble, is required to have "the fine particles of the complex inorganic metal hydrate"; if it is, claims 5-6, 8, 10-11 would fail to further limit claim 4 because the limitations in these claims are already included in claim 4 or do not include the required "fine particles" in claim 4.

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 4-12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chandran et al (5,638,609) in view of either Sabacky et al (2003/0086865) or Metcalfe et al (5,525,559) and optionally further in view of Richards et al (5,123,855).

Chandran '609 discloses a process for drying a stream of materials containing solid particles, said process comprising the steps of:  
generating a pulsating flow of combustion products and an acoustic pressure wave;  
accelerating said pulsating flow of combustion products to create a high velocity pulsating flow field;  
contacting said high velocity pulsating flow field of said combustion products with a fluid containing solid particles, said high velocity pulsating flow field causing said fluid to atomize and to mix with said combustion products, said combustion products transferring heat to said atomized fluid for drying said solid particles contained therein (note claim 1).

The acoustic pressure wave is at a sound pressure level in a range from about 161 dB to about 194 dB and at a frequency in a range from about 50 Hz to about 500 Hz (note claim 4).

Chandran '609 does not specifically disclose the pressure amplitude, however, it would have been obvious to one skilled in the art to optimize such pressure amplitude in the process of Chandran '609 in order to obtain the best results.

Optionally, Richards '845 can be applied to teach that for pulse combustors, pressure amplitude of about 0-200 kPa (= 0-2.04 kg/cm<sup>2</sup>) can be used (note Figure 4 and column 5, lines 16-23).

Chandran '609 teaches that a pulse combustion device provides enhanced heat and mass transfer rates. The pulse combustion device, as opposed to conventional

burners, generates a relatively clean flue gas for drying and has relatively low fuel requirements when used as a heater (note column 4, lines 55-63).

The process of Chandran '609 can be used for a variety of purposes, such as to dry and recover solid materials which include oxides (note column 9, lines 7-30).

The difference is Chandran '609 does not disclose that the process is specifically used to produce zirconium oxide from a raw material liquid containing zirconium.

Sabacky '865 discloses a process to produce nano-sized stabilized zirconium dioxide that comprises:

- a. providing an aqueous solution that includes a zirconium salt and a stabilizing agent;
- b. hydrolyzing the solution to form an intermediate, in a controlled temperature, substantially total evaporation process at a temperature higher than the boiling point of the solution but lower than the temperature where there is significant crystal growth; and,
- c. calcining the hydrolyzed product to form nano-sized agglomerates (note claim 1).

The zirconium salt is selected from the group consisting of zirconium oxysulfate, zirconium oxychloride, zirconium nitrate, and a water-soluble stabilizing agent (note claim 2).

As disclosed in Example 1, zirconium oxychloride and yttrium trichloride are dissolved in a HCl solution. The solution is injected through the nozzle of a spray dryer. The injection process substantially completely evaporates the solution, hydrolyzes the

material, and forms an amorphous intermediate product, which is recovered in a cyclone (note paragraph [0038]). Sabacky '865 fairly teaches that the spray drying is used to simultaneously form the solid product (by hydrolyzing the solution) and to dry such product (by completely evaporating the solution).

Sabacky '865 further discloses that after forming the intermediate product, it can be calcined and milled (note Figure 2, boxes 30 and 40).

Alternatively, Metcalfe '559 can be applied to teach a process for preparing a mixture of zirconia and a stabilizing agent (note claim 1). As disclosed in Example 1, a slurry containing water, zirconia, yttria and dispersant was prepared. The total solids content was 40% by weight of the total slurry weight. The slurry was agitated by passing the slurry through a bead mill. After spray-drying using a rotary atomizer, the yttria/zirconia powder was pressed into pellets and sintered (note column 3, line 65 to column 4, line 16).

The process of Sabacky '865 or Metcalfe '559 and the drying process as disclosed in Chandran '609 are considered as analogous processes because they all "spray drying" method to remove the liquid in the solution and/or suspension by heating.

It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the process of Chandran '609 to produce zirconium oxide because such product is desired in the art as evidenced by Sabacky '865 and Metcalfe '559 and because the process of Chandran '609 provides enhanced heat and mass transfer rates, produces a relatively clean fuel flue gas and has relatively low fuel

requirement as compared to the regular spray dryer used in Sabacky '865 or Metcalfe '559.

Applicant's arguments filed December 17, 2008 have been fully considered but they are not persuasive.

Applicants argue that claim 4 now requires "the concentration of... is 5 to 50% by weight".

If claim 4 positively requires to have fine particles, Metcalfe '559 is applied as stated above to teach that the slurry has 40 wt % of solids content.

Applicants argue that none of cited patents teaches or suggests the elements of "pulse combustion gas has pressure amplitude of at least  $\pm 0.2 \text{ kg/cm}^2$ " and/or the newly added condition that "the concentration is... 5 to 50% by weight".

For the concentration, Metcalfe '559 fairly discloses a value of 40%, which is well within the claimed range. For the amplitude, Richards '845 can be applied as stated above to teach that the claimed range is within a known and conventional range that is commonly used in pulse combustors.

Applicants argue that it was originally recognized the problem that "consider obtaining particles having sharp particle size distribution," and subsequently it was found that the above elements were necessary to solve the above problem.

The above argument is not persuasive because Applicants' claims do not require any particle size distribution. Furthermore, Applicants have not provided any evidence to show the criticality of the amplitude when pulse combustor is used in order to obtain

"particles having sharp particle size distribution". All comparative examples in Applicants' specification used different dryers, not a pulse combustor.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ngoc-Yen M. Nguyen whose telephone number is (571) 272-1356. The examiner can normally be reached on Part time schedule.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stanley Silverman can be reached on (571) 272-1358. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

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/Ngoc-Yen M. Nguyen/  
Primary Examiner, Art Unit 1793

nmn  
April 14, 2009